

Braidwood Station  
35100 South Route 53, Suite 84  
Braceville, IL 60407-9619

www.exeloncorp.com

10 CFR 50.73

September 28, 2009  
BW090091

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Braidwood Station, Unit 2  
Facility Operating License No. NPF-77  
NRC Docket No. STN 50-457

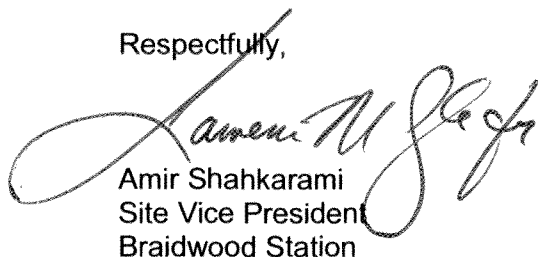
Subject: Licensee Event Report 2009-002-00 – Unit 2 Loss of Offsite Power Coincident with a  
Reactor Trip Due to Loss of 2C Reactor Coolant Pump

The enclosed Licensee Event Report (LER) is being submitted in accordance with 10 CFR 50.73, "Licensee event report system," paragraph (a)(2)(iv)(A), as an event that resulted in a valid actuation of the reactor protection system, emergency AC electrical power system and auxiliary feedwater system. On July 30, 2009, Braidwood Station Unit 2 experienced a loss of offsite power due to a system auxiliary transformer tripping on a sudden pressure relay actuation. This was followed by an automatic reactor trip from full power due to a reactor coolant pump tripping on overcurrent.

10 CFR 50.73(a) requires an LER to be submitted within 60 days following discovery of the event. Therefore, this report is being submitted by September 28, 2009.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this submittal, please contact Mr. David Gullott, Regulatory Assurance Manager, at (815) 417-2800.

Respectfully,



Amir Shahkarami  
Site Vice President  
Braidwood Station

Enclosure: LER 2009-002-00

<b>NRC FORM 366</b> (9-2007)		<b>U.S. NUCLEAR REGULATORY COMMISSION</b>		APPROVED BY OMB: NO. 3150-0104  Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.		EXPIRES: 08/31/2010				
<h2 style="margin: 0;">LICENSEE EVENT REPORT (LER)</h2> <p style="margin: 5px 0;">(See reverse for required number of digits/characters for each block)</p>										
1. FACILITY NAME Braidwood Station, Unit 2				2. DOCKET NUMBER 05000457		3. PAGE 1 of 4				
4. TITLE Unit 2 Loss of Offsite Power Coincident with a Reactor Trip Due to Loss of 2C Reactor Coolant Pump										
5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
07	30	2009	2009	- 002 -	00	09	28	2009	N/A	N/A
									FACILITY NAME	DOCKET NUMBER
									N/A	N/A
9. OPERATING MODE  1		11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)								
10. POWER LEVEL  100		<input type="checkbox"/> 20.2201(b) <input type="checkbox"/> 20.2203(a)(3)(i) <input type="checkbox"/> 50.73(a)(2)(i)(C) <input type="checkbox"/> 50.73(a)(2)(vii)								
		<input type="checkbox"/> 20.2201(d) <input type="checkbox"/> 20.2203(a)(3)(ii) <input type="checkbox"/> 50.73(a)(2)(ii)(A) <input type="checkbox"/> 50.73(a)(2)(viii)(A)								
		<input type="checkbox"/> 20.2203(a)(1) <input type="checkbox"/> 20.2203(a)(4) <input type="checkbox"/> 50.73(a)(2)(ii)(B) <input type="checkbox"/> 50.73(a)(2)(viii)(B)								
		<input type="checkbox"/> 20.2203(a)(2)(i) <input type="checkbox"/> 50.36(c)(1)(i)(A) <input type="checkbox"/> 50.73(a)(2)(iii) <input type="checkbox"/> 50.73(a)(2)(ix)(A)								
		<input type="checkbox"/> 20.2203(a)(2)(ii) <input type="checkbox"/> 50.36(c)(1)(ii)(A) <input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A) <input type="checkbox"/> 50.73(a)(2)(x)								
		<input type="checkbox"/> 20.2203(a)(2)(iii) <input type="checkbox"/> 50.36(c)(2) <input type="checkbox"/> 50.73(a)(2)(v)(A) <input type="checkbox"/> 73.71(a)(4)								
		<input type="checkbox"/> 20.2203(a)(2)(iv) <input type="checkbox"/> 50.46(a)(3)(ii) <input type="checkbox"/> 50.73(a)(2)(v)(B) <input type="checkbox"/> 73.71(a)(5)								
		<input type="checkbox"/> 20.2203(a)(2)(v) <input type="checkbox"/> 50.73(a)(2)(i)(A) <input type="checkbox"/> 50.73(a)(2)(v)(C) <input type="checkbox"/> OTHER								
		<input type="checkbox"/> 20.2203(a)(2)(vi) <input type="checkbox"/> 50.73(a)(2)(i)(B) <input type="checkbox"/> 50.73(a)(2)(v)(D)								
		Specify in Abstract below or in NRC Form 366A								
12. LICENSEE CONTACT FOR THIS LER										
FACILITY NAME David Gullott, Regulatory Assurance Manager									TELEPHONE NUMBER (Include Area Code) (815) 417-2800	
13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT										
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	
D	EA	RLY	W120	Y	N/A	N/A	N/A	N/A	N/A	
14. SUPPLEMENTAL REPORT EXPECTED						15. EXPECTED SUBMISSION DATE		MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO								N/A	N/A	N/A
ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) On July 30, 2009 at 20:59 hours, Unit 2 experienced an automatic reactor trip from full power. The 2C reactor coolant pump (RCP) tripped on overcurrent following the initial loss of system auxiliary transformer (SAT) 242-1 on a sudden pressure relay actuation and subsequent bus 258 transfer. This resulted in an automatic reactor trip from full power due to less than four RCPs in operation above 30% power.  The root causes of the Unit 2 reactor trip were determined to be: 1) the 2C RCP breaker tripped inappropriately due to a combination of an overcurrent trip setpoint time delay shorter than minimum acceptable, and an overcurrent drop out reset value too low; and 2) the procedure for the calibration of overcurrent protective relays does not contain guidance to take an as-found reading / calibration and functional check of the overcurrent drop out reset value.  The corrective actions include: 1) perform a functional check, and calibration of the overcurrent protective relays for the 2C RCP, and on pumps with the same overcurrent protective relay; and 2) revise the procedure for the calibration of overcurrent protective relays to include procedure steps for functional check and calibration, as required, for the high drop out instantaneous values associated with overcurrent time delay relays.  There were no actual safety consequences impacting plant or public safety as a result of this event.  This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv)(A), any event or condition that resulted in manual or automatic actuation of any of the systems listed in 10 CFR 50.73(a)(2)(iv)(B) including any event or condition that results in actuation of the reactor protection system (RPS) when the reactor is critical, actuation of the emergency AC electrical power system, and actuation of the PWR auxiliary feedwater system.										

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## NARRATIVE

**A. Plant Operating Conditions Before The Event:**

Event Date: July 30, 2009

Event Time: 20:59

Unit: 2 MODE: 1

Reactor Power: 100 percent

Unit 2 Reactor Coolant System (RC) [AB]: Normal operating temperature and pressure

**B. Description of Event:**

There were no structures, systems or components inoperable at the beginning of the event that contributed to the severity of the event.

NOTE: The plant is designed so that during normal operations, two of the four reactor coolant pumps (RCPs) are normally powered from the onsite power via unit auxiliary transformers (UATs), and two RCPs powered from offsite power via system auxiliary transformers (SATs) [FK]. The plant is designed so that a fault on either of the power sources will result in an automatic bus transfer (ABT) to the unaffected power source.

On July 30, 2009 at 20:59 hours, Unit 2 received a sudden pressure relay (SPR) actuation on SAT 242-1. In response, the breakers for SATs 242-1 and 242-2 automatically opened (deenergizing the SATs), which deenergized busses 258 and 259 [EA]. Per design, both busses automatically transferred to UATs 241-1 and 241-2.

The 2C RCP, which is powered from bus 258, inappropriately tripped on overcurrent following the bus 258 transfer to UAT 241-2. This resulted in an automatic reactor trip from full power due to less than four RCPs in operation above 30% power. Following the trip of the main generator output breakers, the UATs subsequently deenergized, and the remaining RCPs tripped. Following the Unit 2 reactor trip, the 2A and 2B auxiliary feedwater (AF) [BA] pumps and the 2A and 2B emergency diesel generators [EK] auto started, per design.

Operator response to the trip was proper and all safety related systems, structures, and components operated normally during this event.

This event resulted in an Unusual Event emergency classification due to loss of offsite power greater than 15 minutes. The declaration of an Emergency Classification is reportable per 10CFR50.72(a)(1)(i) and 10CFR50.72(a)(3) within one hour of the declaration. At 21:12 hours on July 30, 2009, state and local government agencies were notified via the Nuclear Accident Reporting System (NARS). At 21:55 hours on July 30, 2009, the NRC Operations Center was notified via the Emergency Notification System (ENS).

Since SAT 242-1 had an SPR actuation and a possible internal fault, the plant recovery was accomplished by removing the SAT 4 kV [EB] and 6.9 kV moveable disconnect links on the transformer low side of SAT 242-1 and opening the 345 kV high side motor operated disconnect to SAT 242-1. The offsite power was restored to Unit 2 by reenergizing SAT 242-2 that was disconnected from the potentially faulted SAT 242-1. At 00:36 hours on August 2, 2009, following placing of the safety 4kV busses on SAT 242-2, the Unusual Event was terminated. At 15:18 hours on August 2, 2009, the NRC Operations Center was notified via ENS.

This event is reportable under 10 CFR 50.73(a)(2)(iv)(A), any event or condition that resulted in manual or automatic actuation of any of the systems listed in 10 CFR 50.73(a)(2)(iv)(B) including any event or condition that results in actuation of the reactor protection system (RPS) when the reactor is critical, actuation of the emergency AC electrical power system, and actuation of the PWR auxiliary feedwater system.

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**C. Cause of Event**

It was determined that the 2C RCP trip was not due to the SPR actuation on SAT 242-1, but occurred following the ABT of the 6.9 kV feed to bus 258 from SAT 242-2 to UAT 241-2, since both 2B and 2D condensate / condensate booster pumps (CD/CB) [SD] continued to run for approximately 40 seconds after the 2C RCP trip and subsequent reactor trip. The 2B and 2D CD/CB pumps continued to run because the UATs were still energized. Following the reactor trip, a turbine trip occurs. The main generator does not trip for approximately 60 seconds after the turbine trip. The main generator is motorized from the switchyard and continues to feed power to the UATs. When the main generator output breakers in the switchyard trip, the UATs are subsequently deenergized.

Testing of the 2C RCP overcurrent protective relays found that the overcurrent dropout and the time delay associated with this relay were out of tolerance. Specifically, the C phase relay was found to trip earlier than allowed by the relay setting order (83 milliseconds versus an expected 90 to 110 milliseconds) and the current drop out settings for these relays were lower than required (83% to 75% versus the expected 90% of the trip setpoint). The combination of a shorter than intended time delay and an extended period that the overcurrent element was picked up resulted in a condition in which the breaker would trip when a trip is not warranted. The net result of these two out-of-tolerance conditions caused the 2C RCP to inappropriately trip on overcurrent.

Additionally, a review of the procedure for calibration and functional checks of the RCP overcurrent relays determined that no guidance is provided in the procedure to ensure that the overcurrent protective relays are periodically checked or the settings verified.

Therefore, the root causes of the Unit 2 reactor trip were determined to be:

- 1) 2C RCP breaker tripped inappropriately due to a combination of an overcurrent trip setpoint time delay shorter than minimum acceptable per relay setting order, and an overcurrent drop out reset value too low to allow the relay to reset within the time delay window of the relay; and
- 2) The procedure for the calibration of overcurrent protective relays does not contain guidance to take an as-found reading/calibration and functional check of the overcurrent drop out reset value.

**D. Safety Consequences:**

There were no safety consequences impacting plant or public safety as a result of this event.

The reactor trip is designed to prevent Departure from Nucleate Boiling caused by the reduction in total core flow. This event is explicitly described under Updated Final Safety Analysis Report, section 15.3.2, "Complete Loss of Reactor Coolant Flow".

This event resulted in a loss of all offsite power to Unit 2, and a loss of forced cooling to the Unit 2 reactor and use of the Unit 2 Emergency Diesel Generators to power safety related loads. The reactor trip system responded automatically due to the loss of the 2C RCP. During the reactor shutdown, all required safety systems responded appropriately. There was no loss of any function that would have prevented fulfillment of actions necessary to 1) Shutdown the reactor and maintain it in a safe shutdown condition, 2) Remove residual heat, 3) Control the release of radioactive material, or 4) Mitigate the consequences of an accident.

This event did not result in any radiological release to the public.

This event did not result in a safety system functional failure.

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**NARRATIVE**

**E. Corrective Actions:**

The corrective actions include:

- Perform a functional check, and calibration of all Unit 2 RCP overcurrent protective relays (completed).
- Perform a functional check, and calibration of the overcurrent protective relays on pumps with the same overcurrent protective relay as the 2C RCP.
- Revise the procedure for the calibration of overcurrent protective relays to include procedure steps for functional check and calibration, as required, for the high dropout instantaneous values associated with overcurrent time delay relays.

**F. Previous Occurrences:**

There have been no similar Licensee Event Report events at Braidwood Station in the last three years.

**G. Component Failure Data:**

<u>Manufacturer</u>	<u>Nomenclature</u>	<u>Model</u>	<u>Mfg. Part Number</u>
Westinghouse	Reactor Coolant Pump Protective Relay	COM-5	N/A